REPORT DOCUMENTATION PAGE

Form Approved OMB NO. 0704-0188

1. REPORT DATE (DD-MM-YYYY)	2. REPORT TYPE	3. DATES COVERED (From - To)
12-05-2016	Final Report	1-Apr-2015 - 31-Oct-2015

4. TITLE AND SUBTITLE
Final Report: 2015 Materials Research Society Spring Meeting

5a. CONTRACT NUMBER
W911NF-15-1-0106

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER
611102

6. AUTHORS
Jay Narayan, J. Ardie Dillen

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAMES AND ADDRESSES
Materials Research Society
506 Keystone Dr.

Warrendale, PA 15086 -7573

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS (ES)
U.S. Army Research Office
P.O. Box 12211
Research Triangle Park, NC 27709-2211

10. SPONSOR/MONITOR'S ACRONYM(S)
ARO

11. SPONSOR/MONITOR'S REPORT NUMBER(S)
67084-MS-CF.1

12. DISTRIBUTION AVAILIBILITY STATEMENT
Approved for Public Release; Distribution Unlimited

13. SUPPLEMENTARY NOTES
The views, opinions and/or findings contained in this report are those of the author(s) and should not contrued as an official Department of the Army position, policy or decision, unless so designated by other documentation.

14. ABSTRACT
The 2015 Materials Research Society Spring Meeting was held April 6-10 in San Francisco, CA. The scientific sessions included many emergent areas of materials research as well as some well-established ones. The frequent occurring overlap of topics among the various clusters is a manifestation of the inter- and cross-disciplinary of contemporary materials science and engineering. Symposium FF brought together materials scientists with expertise in synthesis and processing, characterization of defects and interfaces, structure-property correlations and modeling to address critical issues in novel semiconductor structures needed for next generation systems. These

15. SUBJECT TERMS
Defects in Semiconductors, Optoelectronic Properties, Bio-Nano Interfaces, Synthesis, Modeling

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	15. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			J. Ardie Dillen
UU	UU	UU	UU		19b. TELEPHONE NUMBER 724-779-2711

Report Title

Final Report: 2015 Materials Research Society Spring Meeting

ABSTRACT

The 2015 Materials Research Society Spring Meeting was held April 6-10 in San Francisco, CA. The scientific sessions included many emergent areas of materials research as well as some well-established ones. The frequent occurring overlap of topics among the various clusters is a manifestation of the inter- and cross-disciplinary of contemporary materials science and engineering. Symposium FF brought together materials scientists with expertise in synthesis and processing, characterization of defects and interfaces, structure-property correlations and modeling to address critical issues in novel semi-conductor structures needed for next-generation systems. These systems include microelectronic and optoelectronic devices and smart sensors which are of critical importance to the needs of US Army. Research reported in Symposium GG supports the development of new intelligence systems, biologically strong and lightweight materials, advanced electronics, and sustainable catalysts.

Enter List of papers submitted or published that acknowledge ARO support from the start of the project to the date of this printing. List the papers, including journal references, in the following categories:

(a) Papers published in peer-reviewed journals (N/A for none)

Received Paper

TOTAL:

Number of Papers published in peer-reviewed journals:

(b) Papers published in non-peer-reviewed journals (N/A for none)

Received Paper

TOTAL:

Number of Papers published in non peer-reviewed journals:

(c) Presentations

Number of Presentations: 153.00

Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

TOTAL:

Number of Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

TOTAL:

Number of Peer-Reviewed Conference Proceeding publications (other than abstracts):

(d) Manuscripts

Received Paper

TOTAL:

Number of Manuscripts:

Books

Received Book

TOTAL:

Received	Book Chapter

TOTAL:

Patents Submitted

Patents Awarded

Awards

Graduate Students

NAME	PERCENT_SUPPORTED

FTE Equivalent:
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Names of Post Doctorates

NAME	PERCENT_SUPPORTED

FTE Equivalent:
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Names of Faculty Supported

NAME	PERCENT_SUPPORTED

FTE Equivalent:
Total Number:

Names of Under Graduate students supported

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Number of graduating undergraduates who achieved a 3.5 GPA to 4.0 (4.0 max scale):..... 0.00

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Names of Personnel receiving masters degrees

NAME

Total Number:

Names of personnel receiving PHDs

NAME

Total Number:

Names of other research staff

NAME PERCENT_SUPPORTED

FTE Equivalent:
Total Number:

Sub Contractors (DD882)

Inventions (DD882)

Scientific Progress

Symposia FF and GG summaries and programs are included in the attached document.

Technology Transfer

Symposia FF and GG summaries and programs are attached.

Final report for ARO Grant W911NF-15-1-0106

Symposium FF, Defects in Semiconductors: Relationship to Optoelectronic Properties
http://www.mrs.org/spring-2015-program-ff/

Organizers

Zuzanna Liliental-Weber, Lawrence Berkeley National Laboratory, Berkeley, CA 94720
Yong Chen, University of California, Los Angeles CA 90095
Jay Narayan, North Carolina State University, Raleigh, NC 27695
Eicke R. Weber, Fraunhofer Institute for Solar Energy Systems, Freiburg, Germany

Symposium Highlights:
The symposium highlighted the role of defects in controlling the electronic, magnetic and optical properties, which are critical to device performance. The correlations between atomic structure and properties were shown to play a very important role and reliability of nanoscale devices. The following talk was included in the MRS Meeting Scene e-Newsletter:

The Impact of Trench Defects in InGaN/GaN Light Emitting Diodes and Implications for the "Green Gap" Problem (Fabien Massabuau, University of Cambridge)

Trench defects are a commonly occurring flaw in InGaN/GaN quantum well (QWs) structures, where a region of material is enclosed by a V-shaped trench, but the impact of trench defects on light-emitting diodes (LEDs) has been largely overlooked, leading Fabien Massabuau and his collaborators to design experiments that revealed a high density of trench defects lowers green LED efficiency. InGaN/GaN QW structures grown by metalorganic vapor phase epitaxy increased trench defect density with different trimethylindium (TMI) fluxes, with up to a 10-fold increase in trench defect density. Two LED structures were grown under identical conditions as the initial QW structures with a p-doped GaN layer deposited on top of the QWs. High angle annular dark field scanning transmission electron microscopy revealed active region degradation during the growth and anneal of the p-doped GaN layer. Samples grown with five QWs grown at a temperature ranging from 690^{o}C to 780^{o}C and with no p-GaN deposited, exhibited a two decade increase in the density of trench defects between blue- and green-emitting QW structures, resulting in (45 ± 2) % of the surface of the green-emitting structure being covered by trench defects, implying that the efficiency of green-emitting LEDs is strongly affected by the presence of trench defects. Their results mirror the model that the "green gap" problem relates to localized strain relaxation occurring from defects.

Future Directions:
As devices are getting smaller, a better control of defects will play a critical role. In addition, if these defects can be made stable, they can be used to play and active useful role, as opposed to detrimental role.

Grant Expenditures:
ARO Grant funds ($4K total) were used to provide partial support for meeting travel and registration for selected invited speakers.

About the MRS Symposium

This symposium brought together materials scientists with expertise in synthesis and processing of semiconductors, characterization of defects and interfaces, structure-property correlations and modeling to address critical issues in energy related materials needed for next-generation systems. With increasing demands of energy consumption, development of new renewable energy technologies is a necessary step to drastically reduce carbon emission from fossil fuels. Materials hold the key to advanced renewable energy technologies including solar cells, batteries, fuel cells, and catalysis. Semiconductor materials including oxides can provide future high efficiency sources of visible light, visual displays, photovoltaic energy conversion devices and of a large variety of sensors and power control systems for energy generation, conservation, and distribution. Furthermore, characteristics of defects and their control in these materials are crucial for the performance, reliability, and lifetime of energy related devices and systems. For example, among renewable energy technologies, solar energy is a limitless source of energy, and photovoltaic energy conversion is one of the most efficient ways to produce electricity directly from the Sun. The key issue there is to further reduce the cost of photovoltaic energy conversion. Cost reduction of PV can be achieved through reduction of material cost and/or improvement in conversion efficiency.

Defects play a crucial role in limiting the present technologies to realize the predicted high efficiency of these devices. Therefore, understanding the relationships between the fundamental electronic structure, the presence of particular structural defects and/or dopants, and the electrical, magnetic, and optical properties is a necessary step in the development of high efficiency solar energy related materials. Control of these defects determines the commercial viability of a given new material or structure. By varying crystal growth and processing conditions, the effects of defects: dopants, line and planar defects and impurities at surfaces, interfaces and in the bulk can be investigated. The influence of these defects on the properties of the particular devices can be demonstrated.

Although extended defects are generally detrimental for device performance in conventional thin-film and bulk materials, point defects and some extended defects can in some cases be controlled, particularly at the nanoscale, such that device performance is enhanced. Point defects can impart useful electrical and magnetic properties and enhance functionalities of solid state devices. Selective doping as well as internal surfaces and interfaces that confine electronic carriers or alter scattering rates of phonons that can be engineered to produce nanostructured materials whose performance cannot be duplicated in conventional materials.

The focus of this symposium was on the identification, manipulation, and elimination of various defects in energy related materials. These defects can be formed during material growth or introduced via various methods during device processing that relate to and influence particular electrical and/or optical properties of materials.

The first day of the Symposium was devoted to the memory of Professor Jack Washburn who passed away at the age of 92 in October 2013. His teaching and research at UC Berkeley and the Lawrence Berkeley National Laboratory provided a fundamental basis for the understanding of defects in semiconductors, particularly interplay between point defects, dislocations and planar defects. It should be noted that defects in semiconductors and their control through laser-solid interactions and transient thermal processing were critical to the highly successful launch of the Materials Research Society, as evidenced by the series of early symposia on these topics.

A partial list of invited speakers included:

T. Sands-Virginia Tech
Subhash Mahajan-UC Davis
K.M. Yu-Lawrence Berkeley Laboratory,
I. Tischer-University of Ulm, Germany
Chris Van de Walle -UC Santa Barbara
Su-Huai Wei -NREL
Yanfa Yan -University of Toledo, OH
H. Amano-Nagoya University, Japan
S. Pantelides-Vanderbilt
Maria Varela- Oak Ridge National Laboratory;
Yimei Zhu - Brookhaven National Lab

Symposium Participants supported with ARO funds:

Mourad Benamara, University of Arkansas
Yong Chen, UCLA
Maribel Jaquez, UC-Berkeley
Chris Van de Walle, UC-Santa Barbara
Yanfa Yan, University of Toledo
Tonio Buonassisi, MIT
Roberto dos Reis, LBNL
Sokrates Pantelides, Vanderbilt University

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MATERIALS RESEARCH SOCIETY
Advancing materials. Improving the quality of life.

Program: Symposium FF—Defects in Semiconductors–Relationship to Optoelectronic Properties

2015 MRS Spring Meeting & Exhibit

April 6-10, 2015
San Francisco, California

2015-04-07

Symposium FF

Show All Abstracts

Symposium Organizers

- Yong Chen, Univ of California, Los Angeles
- Zuzanna Liliental-Weber, Lawrence Berkeley National Laboratory
- Jagdish Narayan, North Carolina State University
- Eicke Weber, Fraunhofer ISE

Support

- Fraunhofer-Institut fur Solare Energiesysteme ISE
  Lawrence Berkeley National Laboratory
  Materials Science Department UC Berkeley
  University of Texas at Austin

FF1:Structure-Property-Relationship I (In Memory of Prof. J. Washburn)

- Chair: Z Liliental-Weber
- Tuesday AM, April 7, 2015
- Moscone West, Level 3, Room 3016

8:15 AM - *FF1.01

Professor Jack Washburn Memorial Contributions

Mark Asta1.

1, Department of Materials Science and Engineering, University of California, Berkeley, California, United States.

Show Abstract

8:45 AM - *FF1.02

Metal/Semiconductor Superlattices ... at Last

Timothy Sands1 2, Bivas Saha3.

1, Department Electrical & Computer Engineering, Virginia Tech, Blacksburg, Virginia, United States; 2, Department of Materials Science and Engineering, Virginia Tech, Blacksburg, Virginia, United States; 3, Department of Materials Science and Engineering, University of California, Berkeley, Berkeley, California, United States.

Show Abstract

9:15 AM - FF1.03

Interplay of Structural and Optical Properties in CdO

Augustinas Galeckas1, Vishnukanthan Venkatachalapathy1, Andrej Kuznetsov1.

1, Department of Physics/ Centre for Materials Science and Nanotechnology, University of Olso, Oslo, Norway.

Show Abstract

9:30 AM - FF1.04

Temperature Driven Three-Dimensional Ordering of InGaAs/GaAs Quantum Dot Superlattices Grown Under As2 Gas Flux

Mourad Benamara1, Yuriy Mazur1, Peter Lytvyn2 1, Morgan E. Ware1, Vitaliy Dorogan1, Leonardo D. de Souza4 1, Euclydes Marega3, Marcio Theodores4, Gilmar Marques4, Greg Salamo1.

1, Institute for Nanoscience & Engineering, University of Arkansas, Fayetteville, Arkansas, United States; 2, NAS of Ukraine, USAbV. Lashkaryov Institute of Semiconductor Physics, Kyiv, Ukraine; 3, Instituto de Física de São Carlos, Universidade Federal de São Carlos, São Carlos, Brazil; 4, Departamento de Física, Universidade Federal de São Carlos, São Carlos, Brazil.

Show Abstract

9:45 AM -

BREAK

Show Abstract

10:15 AM - *FF1.05

Structural and Optical Properties of Dislocations in III-Nitrides

Martin Albrecht1, Liverios Lymperakis2, Joerg Neugebauer2.

1, Elektronenmikroskopie, Leibniz-Institut fuer Kristallzuechtung, Berlin, Germany; 2, Computational Materials, Max-Planck-institut fuer Eisenforschung, Düsseldorf, Germany.

Show Abstract

10:45 AM - FF1.06

Segregation of In to Dislocations in InGaN

Matthew Horton1, Sneha Rhode2, Suman-Lata Sahonta2, Menno Kappers2, Sarah Haigh3, Timothy Pennycook4 5, Colin Humphreys2, Michelle Moram1.

1, , Imperial College London, London, United Kingdom; 2, Department of Materials Science and Metallurgy, University of Cambridge, Cambridge, United Kingdom; 3, School of Materials, University of Manchester, Manchester, United Kingdom; 4, SuperSTEM, STFC Daresbury Laboratories, Warrington, United Kingdom; 5, Department of Materials, University of Oxford, Oxford, United Kingdom.

Show Abstract

11:00 AM - FF1.07

Direct Observation of Wavelength Shift in the V-Defects in GaN/InGaN Multi-Quantum Well Structure using Cathodoluminescence in Transmission Electron Microscopy

Young-Woon Kim1, Mi-Hyang Sheen1, Jong Hwan Lee1.

1, , Seoul National University, Seoul, Korea (the Republic of).

Show Abstract

11:15 AM - FF1.08

The Impact of Trench Defects in InGaN/GaN Light Emitting Diodes and Implications for the “Green Gap” Problem

Fabien Massabuau1, Matt Davies2, Fabrice Oehler1, Sarah Pamenter1, Ted Thrush1, Menno Kappers1, Andras Kovacs3, Tim Williams4, Margareth Hopkins5, Colin Humphreys1, Phil Dawson2, Rafal Dunin-Borkowski3, Joanne Etheridge4, Duncan Allsopp5, Rachel Oliver1.

1, , University of Cambridge, Cambridge, United Kingdom; 2, , University of Manchester, Manchester, United Kingdom; 3, Forschungszentrum, Ernst Ruska-Centre for Microscopy and Spectroscopy with Electrons, Jülich, Germany; 4, , Monash Centre for Electron Microscopy, Monash, Victoria, Australia; 5, , University of Bath, Bath, United Kingdom.

Show Abstract

11:30 AM - *FF1.09

Optical Properties of Defects in Nitride Semiconductors

Ingo Tischer1, Matthias Hocker1, Manfred Madel1, Benjamin Neuschl1, Manuel Knab1, Manuel Frey1, Thomas Wunderer2, Robert A.R. Leute3, Junjun Wang3, Ferdinand Scholz3, Johannes Biskupek4, Jörg Bernhard4, Ute Kaiser4, Levin Dieterle5, Heiko Groiss5 6, Erich Müller5, Dagmar Gerthsen5, Klaus Thonke1.

1, Institute of Quantum Matter, Semiconductor Physics Group, University of Ulm, Ulm, Germany; 2, , PARC, Palo Alto, California, United States; 3, Institute of Optoelectronics, University of Ulm, Ulm, Germany; 4, Electron Microscopy Group of Materials Science, University of Ulm, Ulm, Germany; 5, Laboratory for Electron Microscopy, Karlsruhe Institute of Technology, Karlsruhe, Germany; 6, Institute of Semiconductor and Solid State Physics, Johannes Kepler University Linz, Linz, Austria.

Show Abstract

FF2: Structure-Property-Relationship II (In Memory of Prof. J. Washburn)

- Chair: Timothy Sands
- Tuesday PM, April 7, 2015
- Moscone West, Level 3, Room 3016

1:30 PM - *FF2.01

The Role of Defects on CdTe Solar Cell Efficiency

Stephen Pennycook1, Chen Li2, Jonathan Poplawsky3, Naba Paudel4, Mowafak Al-Jassim5, Yanfa Yan6.

1, , University of Tennessee, Knoxville, Tennessee, United States; 2, , University of Vienna, Vienna, Austria; 3, , Oak Ridge National Laboratory, Oak Ridge, Tennessee, United States; 4, , University of Toledo, Toledo, Ohio, United States; 5, , National Renewable Energy Laboratory, Golden, Colorado, United States; 6, , The University of Toledo, Toledo, Ohio, United States.

Show Abstract

2:00 PM - FF2.02

0+2 - A First Principles Study of Interactions Among Point Defects and Grain Boundaries in CdTe

Fatih G Sen2, Christopher Buurma3, Tadas Paulauskas3, Ce Sun1, Moon Kim1, Robert Klie3, Maria K Chan2.

1, , Univ of Texas-Dallas, Richardson, Texas, United States; 2, , Argonne National Laboratory, Argonne, Illinois, United States; 3, , University of Illinois at Chicago, Chicago, Illinois, United States.

Show Abstract

2:15 PM - FF2.03

Characterization of Extended Defects Observed in Cadmium Zinc Telluride (CZT) Crystals

Samuel Uba1, Stephen Oluseyi Babalola1, Anwar Hossain2, Ralph B. James2, Trent Montgomery1.

1, , Alabama A&M University, Huntsville, Alabama, United States; 2, , Brookhaven National Laboratory, Upton, New York, United States.

Show Abstract

2:30 PM - FF2.04

Simulation of the Compensation of Defects in CdTe during Slow Cooling

Dmitry Krasikov2, Andrey Knizhnik2, Boris Potapkin2, Aharon Yakimov1.

1, , GE Global Research Ctr, Niskayuna, New York, United States; 2, , Kintech Lab Ltd., Moscow, Russian Federation.

Show Abstract

2:45 PM -

BREAK

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3:15 PM - *FF2.05

Optical and Structural Nano-Characterization of Extended Defects in III-Nitrides by Low Temperature Scanning Transmission Electron Microscopy Cathodoluminescence

Juergen H. Christen1.

1, , Otto-von-Guericke-University Magdeburg, Magdeburg, Germany.

Show Abstract

3:45 PM - FF2.06

Tailoring the Optical Characteristic of ZnO Nanowires by Using Different Substrates

Caroline Ines Lisevski Sombrio2, Roberto M S dos Reis1, Paulo L Franzen3, Henri I Boudinov3, Daniel Lorscheitter Baptista3.

1, , National Center for Electron Microscopy/Molecular Foundry, Berkeley, California, United States; 2, , Univ Federal-Rio Grande do Sul, Porto Alegre, Brazil; 3, Instituto de Fisica, UFRGS, Porto Alegre, RS, Brazil.

Show Abstract

4:00 PM - FF2.07

Energy Up-Converted Auger Process of Three Donor-Acceptor Pairs to Two Free Excitons (3 D-A pairs to 2 e-h excitons) Associated with Deep Hole Trap in GaN

Katsushi Fujii1, Takenari Goto2, Takafumi Yao3.

1, GS+I, The University of Tokyo, Tokyo, Tokyo, Japan; 2, , RIKEN, Wako, Saitama, Japan; 3, , AIST, Tsukuba, Ibaraki, Japan.

Show Abstract

4:15 PM - FF2.08

Electrical Conduction Along Dislocations Freshly Induced into GaN by Plastic Deformation

Ichiro Yonenaga1, Keiichi Edagawa2.

1, , Tohoku University, Sendai, Japan; 2, , University of Tokyo, Tokyo, Japan.

Show Abstract

4:30 PM - FF2.09

Mechanical and Optical Properties Characterization of c-Plane (0001) and m-Plane (10–10) GaN by Nanoindentation and Luminescence

Toshiya Yokogawa1, Masaki Fujikane2, Sijo Nagao3, Roman Nowak4.

1, , Yamaguchi University, Ube, Japan; 2, , Panasonic, Moriguchi, Japan; 3, , Osaka University, Osaka, Japan; 4, , Aalto University, Aalto, Finland.

Show Abstract

4:45 PM - FF2.10

Multi-Microscopy Investigation of the Optical Properties of Dislocations in InGaN

Fabien Massabuau1, Peiyu Chen1, Tom O'Hanlon1, Chris Ren1, Sneha Rhode1, Andras Kovacs2, Menno Kappers1, Colin Humphreys1, Rafal Dunin-Borkowski2, Rachel Oliver1.

1, , University of Cambridge, Cambridge, United Kingdom; 2, Forschungszentrum, Ernst Ruska-Centre for Microscopy and Spectroscopy with Electrons, Jülich, Germany.

Show Abstract

2015-04-08

Symposium FF

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Symposium Organizers

- Yong Chen, Univ of California, Los Angeles
- Zuzanna Liliental-Weber, Lawrence Berkeley National Laboratory
- Jagdish Narayan, North Carolina State University
- Eicke Weber, Fraunhofer ISE

Support

- Fraunhofer-Institut fur Solare Energiesysteme ISE
  Lawrence Berkeley National Laboratory
  Materials Science Department UC Berkeley
  University of Texas at Austin

FF3: The Role of Defects in Optoelectronic Properties of Nitrides

- Chair: Juergen Christen
- Wednesday AM, April 8, 2015
- Moscone West, Level 3, Room 3016

8:15 AM - *FF3.01

Acceptor States and Defects in Mg-Doped Homoepitaxial GaN

Bo A. Monemar1 2 3.

1, IFM, Linköping University, Linkoping, Sweden; 2, Solid State Physics, Lund University, Lund, Sweden; 3, Global Innovation and Research Organization, Tokyo University of Agriculture and Technology, Tokyo, Japan.

Show Abstract

8:45 AM - FF3.02

How to Deactivate Harmful Defects and Active them for New Spin Functionalities in a Semiconductor?

Weimin M. Chen1, I A Buyanova1, Y Puttisong1, X J Wang1, C W Tu2, A J Ptak3, L Geelhaar4, H Riechert4.

1, , Linkoping University, Linkoping, Sweden; 2, , University of California, La Jolla, California, United States; 3, , National Renewable Energy Lab, Golden, Colorado, United States; 4, , Paul-Drude-Institut für Festkörpelektronik, Berlin, Germany.

Show Abstract

9:15 AM - *FF3.04

Properties of State of the Art of Ammonothermal and Hydride Vapor Phase Epitaxyal GaN Substrates

Jaime A. Freitas1, Nadeemullah Mahadik1, James Culbertson1, Tomasz Sochacki2, Michal Bockowski2.

1, , Naval Reserach Laboratory, Washington, District of Columbia, United States; 2, , UNIPRESS, Wasaw, Poland.

Show Abstract

9:45 AM - FF3.05

Spectroelectrochemical Studies on the Defect-Related Photoluminescence from ZnO Nanocrystals

Peter Andreas Schulze1, Carlos Burga1, Michael Bartl1.

1, Dept of Chemistry, Univ of Utah, Salt Lake City, Utah, United States.

Show Abstract

10:00 AM -

BREAK

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10:30 AM - *FF3.06

Impact of Point Defects on Efficiency of Nitride Light Emitters

Chris G. Van de Walle1.

1, , University of California, Santa Barbara, Santa Barbara, California, United States.

Show Abstract

11:00 AM - FF3.07

Studies of Gamma-Irradiation Induced Effect on Electronic Carrier Transport Properties of AlGaN/GaN High Electron Mobility Transistors

Anupama Yadav1, Elena Flitsiyan1, Leonid Chernyak1, Igor Lubomirsky2.

1, Department of Physics, University of Central Florida, Orlando, Florida, United States; 2, Materials & Interfaces, Weizmann Inst of Science, Rehovot, Israel.

Show Abstract

11:15 AM - *FF3.08

Structural and Optical Properties of Highly Mismatched $GaN_{1-x}Sb_x$ Alloys

Kin Man Yu1 2, Sergei V. Novikov3, Min Ting4 2, W.L. Sarney6, S.P. Svensson6, Martin Shaw7, R.W. Martin7, Wladyslaw Walukiewicz5, C. T. Foxon3.

1, , City University of Hong Kong, Kowloon, Hong Kong; 2, Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, California, United States; 3, , School of Physics and Astronomy, University of Nottingham, Nottingham, United Kingdom; 4, , University of California, Berkeley, Berkeley, California, United States; 5, , Lawrence Berkeley National Lab, Berkeley, California, United States; 6, , US Army Research Laboratory, Adelphi, Maryland, United States; 7, Department of Physics, University of Strathclyde, Glasgow, United Kingdom.

Show Abstract

11:45 AM -

OPEN DISCUSSION

Show Abstract

FF4: Defects in Oxides and Their Properties I

- Chair: Jagdish Narayan
- Wednesday PM, April 8, 2015
- Moscone West, Level 3, Room 3016

1:30 PM - *FF4.01

Role of Defects in Oxide Electronics

John T. Prater2 3, Srinivasa Rao Singamaneni2 3, Jagdish Narayan1.

1, , North Carolina State University, Raleigh, North Carolina, United States; 2, Materials Science Division, U.S. Army Research Office, Durham, North Carolina, United States; 3, Matierlais Science and Engineering, North Carolina State University, Raleigh, North Carolina, United States.

Show Abstract

2:00 PM - FF4.02

Microstructure and Transport Properties of Bi_2Se_3 Thin Films Grown on MgO (111), Cr_2O_3 (0001) and Al_2O_3 (0001) Substrates

Yi-Fang Lee1, Jagdish Narayan1, Justin Schwartz1.

1, Materials Science and Engineering, North Carolina State University, Raleigh, North Carolina, United States.

Show Abstract

2:15 PM - FF4.03

Recent Advances in Identifying Point Defects in Semiconducting Oxides using Positron Annihilation Spectroscopy

Filip Tuomisto1, Ilja Makkonen1, Esa Korhonen1.

1, , Aalto University, Aalto, Finland.

Show Abstract

2:30 PM - FF4.04

Novel “Tiling” Building Defects in Layered Compounds

T. Mori1 2, X. J. Wang3 4, I. Kuzmych-Ianchuk1, Y. Michiue1, K. Yubuta5, T. Shishido5, Y. Grin6, S. Okada7, D. G. Cahill3.

1, , NIMS, Tsukuba, Japan; 2, , U. Tsukuba, Tsukuba, Japan; 3, , U. Illinois, Urbana, Illinois, United States; 4, , U. Minnesota, Minnesota, Minnesota, United States; 5, , Tohoku U., Sendai, Japan; 6, , MPI-CPfS, Dresden, Germany; 7, , Kokushikan U., Tokyo, Japan.

Show Abstract

2:45 PM - FF4.05

Copper-Alloyed Zinc Sulfide: A Room Temperature Processed P-Type Transparent Material with Record Conductivity

Rachel Woods-Robinson1, Jason Cooper1, Xiaojie Xu1, Joel W. Ager1.

1, , Lawrence Berkeley National Laboratory, Berkeley, California, United States.

Show Abstract

3:00 PM -
BREAK

Show Abstract

3:30 PM - *FF4.09
Interfacial Engineering of Large Bandgap Oxide Nanostructures for Solar Energy Conversion

Lionel Vayssieres1.

1, IRCRE, Xian Jiaotong University, Xian, China.

Show Abstract

4:00 PM - FF4.07
Large Persistent Photoconductivity in Strontium Titanate at Room Temperature

Violet M. Poole1, J. Dashdorj2, Mary Ellen Zvanut2, Matthew D. McCluskey1.

1, , Washington State Unversity, Pullman, Washington, United States; 2, , University of Alabama, Birmingham, Alabama, United States.

Show Abstract

4:15 PM - FF4.08
Exploring the Beneficial Role of Defects in Quantum Dot Solids

Yingjie Zhang1, Danylo Zherebetskyy2, Noah Bronstein3, Daniel Hellebusch3, Lin-Wang Wang4, A. Paul Alivisatos1, Miquel B. Salmeron4.

1, , UC Berkeley, Berkeley, California, United States; 2, , Materials Sciences Division, Lawrence Berkeley National Lab, Berkeley, California, United States; 3, Dept Of Chemistry, Univ of California-Berkeley, Berkeley, California, United States; 4, , Lawrence Berkeley National Lab, Berkeley, California, United States.

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4:30 PM - *FF4.06
Defects, Reconstruction and Formation of 2D Electron-Gas at Oxide Interfaces

Yimei Zhu1 2.

1, , Brookhaven National Lab, Upton, New York, United States; 2, Physics & Astronomy, Stony Brook University, Stony Brook, New York, United States.

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FF5: Poster Session: Defects and Their Optoelectronic Properties in Energy-Related Materials
- Chair: Su-Huai Wei
- Wednesday PM, April 8, 2015
- Marriott Marquis, Yerba Buena Level, Salon 7/8/9

8:00 PM - FF5.01
Study of Oxide Layers on Surfaces of CdZnTe Crystals by X-Ray Photoelectron Spectroscopy

Stephen Oluseyi Babalola1, Claudiu I. Muntele2, Jonathan Lassiter1, Charles Payton1, Madhu Goundla1, Ryan Givens1, Samuel Uba1, Trent Montgomery1.

1, , Alabama A&M University, Huntsville, Alabama, United States; 2, , Cygnus Scientific Services, Huntsville, Alabama, United States.

Show Abstract

8:00 PM - FF5.02

Suppressed the Spontaneous Reaction of Amorphous ZnO Nanowires by Using Plasma Surface Defect Passivation

Chun-Yen Lai1, Ke Teng1, Chien-Min Chang1, Ping-Hung Yeh1.

1, , Tamkang University, New Taipei City, Taiwan.

Show Abstract

8:00 PM - FF5.03

Study of Photoluminescence Properties of Cu_xO Thin Films Prepared by Reactive-RF Magnetron Sputtering

Jiantuo Gan1, Augustinas Galeckas1, Vishnukanthan Venkatachalapathy1, Heine Nygard Riise1, Bengt Gunnar Svensson1, Edouard Monakhov1.

1, Department of Physics /Center for Materials Science and Nanotechnology, University of Oslo, Oslo, Norway.

Show Abstract

8:00 PM - FF5.04

Designing Passivating, Carrier-Selective Contacts for Photovoltaic Devices

Mathieu Boccard1, Priyaranga Koswatta1, Zachary Holman1.

1, Dept of EC&EE, Arizona State Univ, Tempe, Arizona, United States.

Show Abstract

8:00 PM - FF5.05

Investigating Defects in HVPE-Grown Semi-Insulating GaN

Gyanendra Bhattarai1, Christopher L Keck1, Justin D Hurley1, Joseph A Crow1, J H Leach2, K Udwary2, R A Metzger2, A N Caruso1, Michelle M Paquette1.

1, Department of Physics & Astronomy, University of Missouri-Kansas City, Kansas City, Missouri, United States; 2, , Kyma Technologies, Raleigh, North Carolina, United States.

Show Abstract

8:00 PM - FF5.06

Urbach Energy as A Useful Parameter to Describe the Influence of the Defect Chemistry on the Emission and Absorption Bandgap Energies in ZnO Thin Films

David Horwat1, William Chamorro2.

1, , Institut Jean Lamour-Université de Lorraine, Nancy, France; 2, , Institut Jean Lamour-Université de lorraine, Nancy, France.

Show Abstract

8:00 PM - FF5.07

ZnO Nanowire Growth Properties on Selectively Disordered Substrates

Elias James Garratt1, Babak Nikoobakht1.

1, , National Institute of Standards and Technology, Gaithersburg, Maryland, United States.

Show Abstract

8:00 PM - FF5.08

Defects in β-Ga_2O_3 Single Crystals

Viktor Maslov2 1, Vladimir I. Nikolaev2 3 1.

1, Ioffe Physical-Technical Institute, Russian Academy of Sciences, St. Petersburg, Russian Federation; 2, , St Petersburg National Research University ITMO, St Petersburg, Russian Federation; 3, , Perfect Crystals LLC, St. Petersburg, Russian Federation.

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8:00 PM -

FF5.09 WITHDRAWN 4-5-15

Show Abstract

8:00 PM - FF5.10

Exploring the Photovoltage “Potential” of PbS QD Films

Erik Johansson1, Vitalii Dereviankin1, Valentin Uzunov1.

1, , Portland State University, Portland, Oregon, United States.

Show Abstract

8:00 PM -

FF5.11 WITHDRAWN 4-2-15

Show Abstract

8:00 PM - FF5.12

Sn Effects on Thermal Donor Formation in Ge

Kaihei Inoue1, Yu Murao1, Toshinori Taishi3, Kentaro Kutsukake1, Momoko Deura1, Yutaka Ohno2, Ichiro Yonenaga1.

1, , Tohoku University, Sendai, Japan; 2, , Institute for Materials Research, Tohoku University, Sendai, Japan; 3, , Shinshu University, Nagano, Nagano, Japan.

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2015-04-09

Symposium FF

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Symposium Organizers

- Yong Chen, Univ of California, Los Angeles
- Zuzanna Liliental-Weber, Lawrence Berkeley National Laboratory
- Jagdish Narayan, North Carolina State University
- Eicke Weber, Fraunhofer ISE

Support

- Fraunhofer-Institut fur Solare Energiesysteme ISE
  Lawrence Berkeley National Laboratory
  Materials Science Department UC Berkeley
  University of Texas at Austin

FF6: Defects in Oxides and Their Properties II

- Chair: Chris Van de Walle
- Thursday AM, April 9, 2015
- Moscone West, Level 3, Room 3016

8:30 AM - *FF6.01

The Role of Vacancies in Controlling Diverse Properties of Complex Semiconductor System

Sokrates T. Pantelides1 2 3.

1, Department of Physics and Astronomy, Vanderbilt University, Nashville, Tennessee, United States; 2, Department of Electrical Engineering and Computer Science, Vanderbilt University, Nashville, Tennessee, United States; 3, , Oak Ridge National Laboratory, Oak Ridge, Tennessee, United States.

Show Abstract

9:00 AM -

OPEN DISCUSSION

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9:15 AM - FF6.03

Correlated Visible-Light Absorption and Intrinsic Magnetism of $SrTiO_3$ by Oxygen Deficiency: Effects of Bulk or Surface?

Heechae Choi1, Jin Dong Song1, Seungchul Kim1, Kwang-Ryeol Lee1.

1, , Korea Institute of Science and Technology, Seoul, Korea (the Republic of).

Show Abstract

9:30 AM - FF6.04

Uncovering the Connection between Doping and Defects in WO_3

Wennie Wang1, Anderson Janotti1, Chris G. Van de Walle1.

1, Materials Dept., Univ of California-Santa Barbara, Santa Barbara, California, United States.

Show Abstract

9:45 AM - FF6.05

Defect Calculations for Increasingly Complex Semiconductor Materials

Stephan Lany1, Haowei Peng1, Vladan Stevanovic1 2.

1, , NREL, Golden, Colorado, United States; 2, , Colorado School of Mines, Golden, Colorado, United States.

Show Abstract

10:00 AM -

BREAK

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FF7: Roles of Defects in Compound Semiconductors for Solar Cells

- Chair: Kin Man Yu
- Thursday AM, April 9, 2015
- Moscone West, Level 3, Room 3016

10:30 AM - *FF7.01

First-Principles Study of Defects in Solar Cell Absorbers: The Case of CdTe

Su-Huai Wei1.

1, , National Renewable Energy Laboratory, Golden, Colorado, United States.

Show Abstract

11:00 AM - FF7.02

Hydrogenated Indium Oxide - Defects in a High Mobility Transparent Conducting Oxide

Sebastian Husein4, Simone Bernardini4, Steve M Heald3, Robert Gordon3, Laura Ding2, Zachary Holman1, Mariana Bertoni1.

1, Dept of EC&EE, Arizona State Univ, Tempe, Arizona, United States; 2, , Arizona State University, Tempe, Arizona, United States; 3, X-ray Science Division, Advanced Photon Source, Lemont, Illinois, United States; 4, School for Matter, Transport, and Energy, Arizona State University, Tempe, Arizona, United States.

Show Abstract

11:15 AM - FF7.03

Thickness Dependent Band Gap Engineering of Chemically Deposited CdS Thin Films

Amanullah Fatehmulla1, Abdullah Al-Shammari2, Abdullah M Al-Dhafiri1.

1, Department of Physics and Astronomy, King Saud University, Riyadh, Saudi Arabia; 2, Department of Physics, University of Hail, Hail, Saudi Arabia.

Show Abstract

11:30 AM - *FF7.04

Atomistic Study of Grain Boundaries in Polycrystalline Photovoltaic Semiconductors

Yanfa Yan1.

1, , The University of Toledo, Toledo, Ohio, United States.

Show Abstract

FF8: Silicon and Thin Film Solar Cells

- Chair: Eicke Weber
- Thursday PM, April 9, 2015
- Moscone West, Level 3, Room 3016

1:30 PM - *FF8.01

Synchrotron-Based Analytical Techniques Elucidate Defect Structure-Property Relations in Silicon and Thin-Film Solar Cell Material

Rafael Jaramillo1, Sin Cheng Siah2, Rupak Chakraborty2, Ashley Morishige2, Douglas Powell2, Mallory Jensen2, Sergio Castellanos2, Joerg Maser3, Barry Lai3, Matthew Marcus4, David P. Fenning2 5, Jasmin Hofstetter2, Tonio Buonassisi2.

1, , Harvard Univ, Cambridge, Massachusetts, United States; 2, , Massachusetts Institute of Technology, Cambridge, Massachusetts, United States; 3, , Advanced Photon Source, Argonne National Laboratory, Argonne, Illinois, United States; 4, , Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, California, United States; 5, , University of California, San Diego, San Diego, California, United States.

Show Abstract

2:00 PM - FF8.02

White Beam X-Ray Diffraction Topography (WBXDT) Studies of Bridgman Grown CdZnTe Crystals

Stephen Oluseyi Babalola1, Samuel Uba1, Anwar Hossain2, Giuseppe Camarda2, Ralph B. James2, Trent Montgomery1.

1, , Alabama A&M University, Huntsville, Alabama, United States; 2, NNS, Brookhaven National Laboratory, Upton, New York, United States.

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2:15 PM - FF8.10

Electrical Characteristics of RF Sputtered ZnO/HfO_2 Interfaces in Thin Film Transistors

Prem Shankar Thapaliya1, Rashmi Jha1.

1, , University of Toledo, Toledo, Ohio, United States.

Show Abstract

2:30 PM - FF8.04

Many Body Perturbation Theory Study of Defects in Crystalline and Amorphous SiO_2 and GeO_2 and the Influence of Dopants

Nicolas Richard1, Layla Martin Samos3 2, Luigi Giacomazzi3, Sylvain Girard4, Aziz Boukenter4, Youcef Ouerdane4, Blaz Winkler2.

1, , CEA, Arpajon, France; 2, Materials Research Laboratory, University of Nova Gorica, Nova Gorica, Slovenia; 3, DEMOCRITOS, CNR-IOM, Trieste, Italy; 4, Laboratoire Hubert Curien, Université de Saint-Etienne, Saint-Etienne, France.

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2:45 PM -

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3:15 PM - *FF8.05

Quantifying the Role of Recombination Active Defects in Multicrystalline Silicon for Photovoltaics

Martin C Schubert1, Wolfram Kwapil1 2, Jonas Schoen1, Bernhard Michl1, Florian Schindler1 2, Wilhelm Warta1.

1, , Fraunhofer Institute for Solar Energy Systems, Freiburg, Germany; 2, FMF, University of Freiburg, Freiburg, Germany.

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3:45 PM - FF8.06

Utilization of Functional Grain Boundaries for Mono-Like Si for Solar Cells

Kentaro Kutsukake1, Yutaka Ohno1, Momoko Deura1, Ichiro Yonenaga1.

1, , Tohoku University, Sendai, Japan.

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4:00 PM - FF8.07

Effects of Bond Distortions on Impurity Segregation in High-Angle Grain Boundaries in Silicon

Yutaka Ohno3, Kaihei Inoue3, Momoko Deura3, Kentaro Kutsukake3, Ichiro Yonenaga3, Naoki Ebisawa4, Yasuo Shimizu4, Koji Inoue4, Yasuyoshi Nagai4, Hideto Yoshida2, Seiji Takeda2, Shingo Tanaka1, Masanori Kohyama1.

1, , AIST Kansai, Osaka, Japan; 2, , Osaka University, Osaka 567-0047, Japan; 3, , IMR, Tohoku University, Sendai, Japan; 4, , The Oarai Center, IMR, Tohoku University, Oarai, Japan.

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4:15 PM - FF8.08

Molecular Dynamics Study of Dislocation Formation Mechanism in <112>-Oriented Si-Ge Core-Shell Nanowires Under Tension

HyungGyu Lee1, Keonwook Kang1.

1, , Yonsei University, Seoul, Korea (the Republic of).

Show Abstract

4:30 PM - FF8.09

Correlation Between Cristalline Defects and Electrical Response in 4H-SiC Schottky Diodes by Simultaneous Photoluminescence and Photocurrent Measurements

Stefania Privitera1, Massimo Camarda1, Nicolo Piluso1, Ruggero Anzalone1, Francesco La Via1.

1, Institute of Microelectronics and Microsystems, National Research Council, Catania, Italy.

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Symposium GG, Foundations of Bio/Nano Interfaces: Synthesis, Modeling, Design Principles, and Applications

The symposium focused on fundamental understanding of biological/biomimetic-solid interfaces as well as their implementation into ordered nanoscale assemblies for drug delivery, tissue replacements, catalysis, sensors, electronics, and photonics applications.

The symposium promoted the exchange of cutting edge research on bionanointerfaces at the 1 to 100 nm scale, discussion of approaches for the rational design of biomimetic materials, and identification of novel applications in biosensors, catalysts, ultra strong composites, electronics, and photonics devices. The symposium built on invited talks from thought leaders in the field of bionanointerfaces and included state-of-the-art experimental as well as modeling contributions that were balanced to cross-fertilize related research communities. Research reported in this symposium supported the development of new intelligence systems, biologically strong and lightweight materials, advanced electronics, and sustainable catalysts. The symposium consisted of 9 half day sessions and comprised 18 invited talks, 64 contributed talks, as well as 48 poster presentations, totaling 130 contributions.

The symposium topics had broad significance for developments across the materials and defense research community. Hierarchical organization from the nanoscale to the macroscale helps achieve greatest specificity and functional diversity of materials and structures, and the integration of laboratory studies with ever-increasing computational methods offers many benefits. The symposium was opened to all attendees of the MRS Spring Meeting and included broad participation from graduate students, post-docs, as well as senior researchers from academia, government, and industry. Opportunities for collaboration as well as career opportunities among the participants and their institutions were explored. Symposium GG also had a significant amount of international presenters, particularly from Japan (Yuhei Hayamizu, Takayoshi Sasaki, Kiyotaka Shiba, Ichiro Yamashita), Europe (Joachim Bill, Stefano Corni, Carole Perry, Nina Heidary), and Australia (Mark Biggs).

ARO support for the symposium helped to defray registration and travel expenses for the following symposium participants:

Hendrik Heinz, University of Colorado-Boulder
Ali Dhinojwala, University of Akron
Stefano Corni, CNR Inst of Nanoscience
Catherine Murphy, University of Illinois-Urbana
William Goddard, California Inst of Technology
Jacob Israelachvili, UC-Santa Barbara
Kyle Boone, University of Kansas
Amanda Garley, University of Akron

Symposium GG, Foundations of Bio/Nano Interfaces: Synthesis, Modeling, Design Principles, and Applications
http://www.mrs.org/spring-2015-program-gg/

On-Demand (video recording): Symposium GG: Foundations of Bio/Nano Interfaces-Synthesis, Modeling, Design Principles and Applications: The symposium focused on fundamental understanding of biological/biomimetic-solid interfaces as well as their implementation into ordered nanoscale assemblies for drug delivery, tissue replacements, catalysis, sensors, electronics, and photonics applications.
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OPL volume 1793 Cover and Front matter

MRS Online Proceedings Library Archive, Volume 1793, 2015, pp f1-f5
doi: 10.1557/opl.2015.846, Published online by Cambridge University Press 23 Nov 2015

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2015-04-07

Symposium GG

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Symposium Organizers

- Yuhei Hayamizu, Tokyo Institute of Technology
- Hendrik Heinz, University of Akron
- Carole Perry, Nottingham Trent University
- Candan Tamerler, University of Kansas

GG1: Biomineralization

- Chair: Candan Tamerler
- Chair: Carole Perry
- Tuesday AM, April 7, 2015
- Park Central Hotel, 2nd Floor, Metropolitan III

8:30 AM - GG1.01

Bio-Directed Assembly of Functional One-Dimensional ZnO Nanostructures

Chung Hee Moon1, Tam-Triet Ngo-Duc1, Marzieh Tousi2, Elaine D Haberer1 3.

1, Materials Science and Engineering Program, University of California, Riverside, Riverside, California, United States; 2, Chemical and Environmental Engineering, University of California, Riverside, Riverside, California, United States; 3, Electrical and Computer Engineering, University of California, Riverside, Riverside, California, United States.

Show Abstract

8:45 AM - GG1.02

Peptide-Based Strategies to Control the Structure/Function Relationship of Nanocatalysts

Marc R. Knecht1, Ryan Coppage1, Hadi Ramezani-Dakhel5, Beverly Briggs1, Nicholas Bedford2, Joseph Slocik3, Anatoly Frenkel4, Hendrik Heinz5, Rajesh Naik3.

1, , University of Miami, Coral Gables, FL, United States; 2, , National Institute of Standards and Technology, Boulder, Colorado, United States; 3, , Air Force Research Laboratory, Dayton, Ohio, United States; 4, , Yeshiva University, New York, New York, United States; 5, , University of Akron, Akron, Ohio, United States.

Show Abstract

9:00 AM - GG1.03

Genetically Driven Formation of Biotemplates Made of Tobacco Mosaic Viruses: Towards Nanostructured Bio/inorganic Hybrids

Petia Atanasova1, Nina Sitz1, Shawn Sanctis3, Johannes Maurer2, Sabine Eiben4, Holger Jeske4, Joerg J. Schneider3, Joachim Bill1.

1, , Institute for Materials Science, University of Stuttgart, Stuttgart, Germany; 2, , INM - Leibniz-Institute for New Materials, Saarbruecken, Saarbruecken, Germany; 3, Eduard-Zintl-Institut für Anorganische und Physikalische Chemie, Technical University of Darmstadt, Darmstadt, Germany; 4, Institute of Biomaterials and Biological Systems, University of Stuttgart, Stuttgart, Germany.

Show Abstract

9:15 AM - *GG1.04

Biomimicry at Molecular Scale: Understanding and Designing Interfacial Interactions to Achieve Specific Material Structures

Yu Huang1.

1, , University of California Los Angeles, Los Angeles, California, United States.

Show Abstract

9:45 AM -

OPEN DISCUSSION

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10:00 AM -

BREAK

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10:30 AM - GG1.07

Molecular Engineering of Bioactivity at the Bio-NanoMaterial Interfaces

Candan Tamerler1.

1, , University of Kansas, Lawrence, Kansas, United States.

Show Abstract

10:45 AM - GG1.08

Acid Base Properties of PDMPO and Its Use in the Study of (Bio)Silicification

Mithun Parambath1, Quentin S Hanley1, Carole Celia Perry1.

1, , Nottingham Trent University, Nottingham, United Kingdom.

Show Abstract

11:00 AM - GG1.09

Combined Effect of Soluble Additives and Compartmentalized Environments on the Growth of Hydroxyapatite Crystals

Bartosz Marzec1, Bram Cantaert1, Steven Brookes2, Fiona C. Meldrum1.

1, School of Chemistry, University of Leeds, Leeds, West Yorkshire, United Kingdom; 2, School of Dentistry, University of Leeds, Leeds, West Yorkshire, United Kingdom.

Show Abstract

11:15 AM - GG1.10

The Biomimetic Synthesis and Hydrothermal Devitrification of Highly Photocatlytic TiO_2 Hybrid Nanomaterials

Matthew B. Dickerson2, Paul Griffin2, Nicholas Bedford1 2, Lloyd Nadeau2, Peter A. Mirau2, Joseph M. Slocik2, Rajesh R. Naik2, Michael Jespersen2.

1, , National Institute of Standards and Technology, Boulder, Colorado, United States; 2, Materials and Manufacturing Directorate, Air Force Research Laboratory, Dayton, Ohio, United States.

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GG2: Nanomaterials with Biomolecules I

- Chair: Hendrik Heinz
- Chair: Carole Perry
- Tuesday PM, April 7, 2015
- Park Central Hotel, 2nd Floor, Metropolitan III

1:30 PM -

GG2.01 moved to GG8.00

Show Abstract

1:30 PM - *GG2.02

The Chemical Nature of the Gold Nanoparticle-Biomolecule Interface

Catherine Jones Murphy1.

1, , University of Illinois at Urbana-Champaign, Urbana, Illinois, United States.

Show Abstract

2:00 PM - GG2.03

Gold Nanoparticle - Lipid Self-Assembly and Interactions: Insights from Computer Modeling

Zilu Wang1, Elena Dormidontova1.

1, Institute of Materials Science and Physics Department, University of Connecticut, Storrs, Connecticut, United States.

Show Abstract

2:15 PM - GG2.04

A Robust Surface Plasmon Resonance Based Protocol to Study Biomolecules-Nanoparticle Interactions

Abhijeet Patra2 1, Ding Tao3, Gokce Engudar4, Chester Drum3, Thirumalai Venkatesan2, James Kah4.

1, , NUS Graduate School for Integrative Sciences & Engineering, Singapore, Singapore; 2, , NUSNNI Nanocore, National University of Singapore, Singapore, Singapore; 3, , Cardiovascular Research Institute, National University

of Singapore, Singapore, Singapore; 4, Biomedical Engineering, National University of Singapore, Singapore, Singapore.

Show Abstract

2:30 PM - GG2.05

Monitoring the Size and the Stability of Zinc Oxide Quantum Dots in Biological Media: A Soft Ionization Mass Spectrometry Technique (MALDI-TOF-MS)

Jean Jacques Gaumet1, Gabriel Gaiffe1, Stephane Dalmasso1, Pierre Magri1, Raphael Schneider2.

1, LCP-A2MC, Jean Barriol Institute, University of Lorraine, Metz, France; 2, LRGP, UPR CNRS 3349, University of Lorraine, Nancy, France.

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2:45 PM -

BREAK

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3:15 PM - GG2.06

When Less is More: Grafting Density and Colocation Affect Cell Internalization of Peptide Decorated Nanoparticles

Nevena Todorova1, Ciro Chiappini2, Morgan Mager2, Benjamin Simona2, Imran I. Patel2, Molly M. Stevens2, Irene Yarovsky1.

1, Health Innovations Research Institute and School of Aerospace, Mechanical and Manufacturing Engineering, RMIT University, Melbourne, Victoria, Australia; 2, Department of Materials, Department of Bioengineering, and Institute for Biomedical Engineering, Imperial College London, London, United Kingdom.

Show Abstract

3:30 PM - *GG2.07

Genetic Design of Biology/2D Atomic-Layer Solid Interfaces

Mehmet Sarikaya1.

1, , University of Washington, Seattle, Washington, United States.

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4:00 PM - GG2.08

Interfacial Design of Nanostructured Silicon Photonic Materials for Biomedical Applications

Tiffany Huang1, Kristopher Kilian1.

1, , University of Illinois at Urbana-Champaign, Urbana, Illinois, United States.

Show Abstract

4:15 PM - GG2.09

A Nanohybrid System Based on Holotransferrin and Maghemite Nanoparticles as a Promising Theranostic Device

Miryana Hemadi1, Helene Piraux1, Jun Hai1, Souad Ammar1, Florent Barbault1, Florence Gazeau2, Philippe Verbeke3, Jean-Michel El Hage Chahine1.

1, ITODYS, Université Paris Diderot, Paris, France; 2, MSC, Université Paris Diderot, Paris, France; 3, IJM, Université Paris Diderot, Paris, France.

Show Abstract

4:30 PM - GG2.10

Computational Approaches in Molecular Recognition and Surface Dynamics of Peptides on 2D Solids

Sefa Dag1, Yuhei Hayamizu2, Mehmet Sarikaya1, David Starkebaum1, Tamon Page1.

1, Genetically Engineered Materials Science and Engineering Center, MSE, University of Washington, Seattle, Washington, United States; 2, Organic and Polymeric Materials, Tokyo Institute of Technology, Tokyo, Japan.

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2015-04-08

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Symposium Organizers

- Yuhei Hayamizu, Tokyo Institute of Technology
- Hendrik Heinz, University of Akron
- Carole Perry, Nottingham Trent University
- Candan Tamerler, University of Kansas

GG3: Nanomaterials with Biomolecules II

- Chair: Hendrik Heinz
- Chair: Candan Tamerler
- Wednesday AM, April 8, 2015
- Park Central Hotel, 2nd Floor, Metropolitan III

8:00 AM - GG3.01

M13 Bacteriophage Displaying DOPA on Surfaces: Fabrication of Various Nanostructured Inorganic Materials without Time-Consuming Screening Processes

Joseph Paul Park1, Minjae Do3, Hyo-Eon Jin2, Seung-Wuk Lee2, Haeshin Lee1 3.

1, Nanoscience and Technology, KAIST (Korea Advanced Institute of Science and Technology), Daejeon, Korea (the Republic of); 2, Bioengineering, Univ of California-Berkeley, Berkeley, California, United States; 3, Chemistry, KAIST (Korea Advanced Institute of Science and Technology), Daejeon, Korea (the Republic of).

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8:15 AM - *GG3.02

Quantitative Analysis of the Molecular/Ionic Species Adsorbed on the Surface of a Nanomaterial

Younan Xia1.

1, , Georgia Institute of Technology, Atlanta, Georgia, United States.

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8:45 AM - GG3.03

Microfabricated Nanoporous Gold Coatings Promote Cortical Cell Type-Dependent Surface Coverage

Christopher Chapman1, Hao Chen2, Marianna Stamou2, Juergen Biener3, Monika Biener3, Pamela Lein2, Erkin Seker4.

1, Biomedical Engineering, University of California, Davis, Davis, California, United States; 2, Molecular Biosciences, University of California, Davis, Davis, California, United States; 3, , Lawrence Livermore National Laboratory, Livermore, California, United States; 4, Electrical & Computer Engineering, University of California, Davis, Davis, California, United States.

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9:00 AM - *GG3.04
Elucidating and Controlling Biotic/Abiotic Interfacial Interactions for Enhancing Material Properties

Rajesh Naik1.

1, Soft Matter Materials Branch, Air Force Research Laboratory, Dayton, Ohio, United States.

Show Abstract

9:30 AM - GG3.05
Controlling the Biodistribution of Mesoporous Silica Nanoparticle-Supported Lipid Bilayers by Modulating Properties of the Bio/Nano Interface

Eric C Carnes1, Brandon Slaughter1, Christopher Lino1, Amber McBride2, Marissa R. Anderson1, Patrick Fleig1, Andrew Gomez1, Caroline Bouvie2, Matthew Jackson1, Brian Wilkinson1, Claire Melo1, C. Jeffrey Brinker1 2, Carlee Ashley1.

1, , Sandia National Laboratories, Albuquerque, New Mexico, United States; 2, , University of New Mexico, Albuquerque, New Mexico, United States.

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9:45 AM -
BREAK

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10:15 AM - GG3.06
Induction of Chirality and Chiroptical Activity in Inorganic Nanocrystals Using Biomolecules

Assaf Ben Moshe1, Gil Markovich1.

1, Dept of Chemistry, Tel Aviv Univ, Tel Aviv, Israel.

Show Abstract

10:30 AM - *GG3.07
Atomistic Simulations of Proteins Interacting with Gold Surfaces and Nanoparticles

Stefano Corni1.

1, , Center S3, CNR Institute of Nanoscience, Modena, Italy.

Show Abstract

11:00 AM - GG3.08
Surfactant-Free Nanoparticle-DNA Complexes with Ultrahigh Stability Against Salt for Environmental and Biological Sensing

Jun Hyuk Heo1, Huihun Cho2, Jung Heon Lee1 2.

1, School of Advanced Materials Science and Engineering, Sungkyunkwan University, Suwon, Korea (the Republic of); 2, , Sungkyunkwan University (SKKU) Advanced Institute of Nanotechnology (SAINT), Suwon, Korea (the Republic of).

Show Abstract

11:15 AM - GG3.09
Customisation of Mechanical Properties and Porosity of Tissue Scaffold Materials via Layer-by-Layer Assembly of Polymer-Nanocomposite Coatings

Monika Ziminska1, Nicholas Dunne1, Andrew Hamilton1.

1, Mechanical & Aerospace Engineering, Queen's University Belfast, Belfast, Antrim, United Kingdom.

Show Abstract

11:30 AM - GG3.10

Engineering a Quantum Dot Multiplexing Assay for the Development of Enzyme and Nucleic Acid Diagnostics

Polina Brangel1, Philip D Howes1, Robert Chapman1, Molly Stevens1.

1, Dept of Materials, Imperial College London, London, United Kingdom.

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11:45 AM - GG3.11

Phospholipid Bilayers on Vertical Nanowire Arrays

Aleksandra P Dabkowska1 2, Cassandra S. Niman2 3, Gaelle Piret2, Henrik Persson2 3, Hanna Wacklin4 5, Heiner Linke2 3, Christelle Prinz3 6, Tommy Nylander1 2.

1, Division of Physical Chemistry, Department of Chemistry, Lund University, Lund, Sweden; 2, The Nanometer Structure Consortium (nmC@LU), Lund University, Lund, Sweden; 3, Division of Solid State Physics, Lund University, Lund, Sweden; 4, , European Spallation Source ESS AB, Lund, Sweden; 5, Department of Chemistry, University of Copenhagen, Copenhagen, Denmark; 6, Neuronano Research Center, Lund University, Lund, Sweden.

Show Abstract

GG4: Biomolecular Engineering: Peptides, Proteins, DNA

- Chair: Carole Perry
- Chair: Yuhei Hayamizu
- Wednesday PM, April 8, 2015
- Park Central Hotel, 2nd Floor, Metropolitan III

1:30 PM - GG4.01

Understanding the Thermodynamics of DNA Hybridization to Spherical Nucleic Acids

Matthew Robert Jones2, Pratik Randeria3, Kevin Kohlstedt4, Resham Banga5, Monica Olvera de la Cruz1, George C. Schatz1, Chad A. Mirkin4.

1, , Northwestern University, Evanston, Illinois, United States; 2, Materials Science & Engineering, Northwestern University, Evanston, Illinois, United States; 3, Biomedical Engineering, Northwestern University, Evanston, Illinois, United States; 4, Chemistry, Northwestern University, Evanston, Illinois, United States; 5, Chemical and Biological Engineering, Northwestern University, Evanston, Illinois, United States.

Show Abstract

1:45 PM - *GG4.02

The Design Principals for Colloidal Crystals made from Proteins Modified with Nucleic Acids

Chad A. Mirkin1.

1, , Northwestern University, Evanston, Illinois, United States.

Show Abstract

2:15 PM - GG4.03

The INTERFACE Force Field to Unite Materials and Biomolecular Simulation in a Single Platform: Examples of Protein Recognition on Metals, Silicates, and Phosphates

Hendrik Heinz1.

1, , University of Akron, Akron, Ohio, United States.

Show Abstract

2:30 PM - GG4.04

Conductance Properties of DNA Duplexes and DNA:RNA Hybrids

Joshua Hihath1, Yuanhui Li1, Juan Manuel Artes Vivancos1, Jianqing Qi2, M P Anantram2.

1, Electrical and Computer Engineering, University of California - Davis, Davis, California, United States; 2, Electrical Engineering, University of Washington, Seattle, Washington, United States.

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2:45 PM -

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3:15 PM - *GG4.05

Molecular Modelling of Peptide Adsorption: From Fundamentals to Design to Applications

Mark James Biggs1.

1, , Loughborough University, Loughborough, United Kingdom.

Show Abstract

3:45 PM - GG4.06

In Silico Design of Bioactive Peptides for Bio-Material Surface Decoration

Chiara Cosenza1, Filippo Causa1 3 2, Paolo Antonio Netti1 3 2.

1, Center for Advanced Biomaterials for Health Care, Istituto Italiano di Tecnologia, Naples, Italy; 2, Department of Chemical and Materials Engineering and Industrial Production, University of Naples "Federico II", Naples, Italy; 3, Interdisciplinary Research Centre on Biomaterials (CRIB), University of Naples "Federico II", Naples, Italy.

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4:00 PM - GG4.07

ZnO-Binding Peptides: Smart, Versatile Tools for Controlled Modificaiton of ZnO Growth Mechanism and Morphology

Carole Celia Perry1, Marion Jebet Limo1.

1, , Nottingham Trent University, Nottingham, United Kingdom.

Show Abstract

4:15 PM - GG4.08

Sequence-Dependent Structure/Function Elucidation of Peptide-Enabled Nanoparticles Using a Combined Experimental/Computational Approach

Nicholas Bedford1, Rajesh Naik2, Marc R Knecht5, Hendrik Heinz7, Tiffany Walsh6, Valeri Petkov3, Anatoly Frenkel8, Lauren F Greenlee4.

1, , National Institute of Standards and Technology, Boulder, Colorado, United States; 2, , Air Force Research Laboratory, Dayton, Ohio, United States; 3, Dept. Physics, Central Michigan University, Mt Pleasant, Michigan, United States; 4, , National Institute of Standards & Technology, Boulder, Colorado, United States; 5, , University of Miami, Coral Gables, Florida, United States; 6, , Deakin Univ, Geelong, Victoria, Australia; 7, , University of Akron, Akron, Ohio, United States; 8, , Yeshiva University, New York, New York, United States.

Show Abstract

4:30 PM - GG4.09

Peptide Modification of Polyimide-Insulated Microwires

Sangita Sridar1, Matthew Churchward1, Kathryn Todd1, Anastasia Leila Elias1.

1, , University of Alberta, Edmonton, Alberta, Canada.

Show Abstract

GG5: Poster Session: Foundations of Bio/Nano Interfaces

- Chair: Candan Tamerler
- Wednesday PM, April 8, 2015
- Marriott Marquis, Yerba Buena Level, Salon 7/8/9

8:00 PM - GG5.01

Understanding the Interactions Between Gold Nanorods and Cell Membrane Models

Thiers Massami Uehara1, Juliana Cancino1, Valeria Marangoni1, Paula Lins1, Paulo Barbeitas Miranda1, Valtencir Zucolotto1.

1, , Universidade de Sao Paulo, Sao Carlos, Sao Paulo, Brazil.

Show Abstract

8:00 PM - GG5.02

Peptide Functionalized Magnetic Nanoparticles for Gold Mining

Weizheng Shen1 2, Sibel Cetinel1 2, Carlo Montemagno1 2.

1, , Ingenuity Lab, Edmonton, Alberta, Canada; 2, Chemical and Materials Engineering, University of Alberta, Edmonton, Alberta, Canada.

Show Abstract

8:00 PM - GG5.03

Synthesis of an Fe Rich Amorphous Structure with a Catalytic Effect to Rapidly Decolorize Azo Dye at Room Temperature

Peng Liu1, Chan Hung Shek1.

1, Physics and Materials Science, City University of Hong Kong, Hong Kong, China.

Show Abstract

8:00 PM - GG5.04

Biologically-Inspired Polymer-Protein Hybrid Membranes for Water Purification

Yuan He1 2, Hiofan Hoi1 2, Sinoj Abraham1 2, Jeffrey Germain2, Carlo Montemagno1 2 3.

1, Chemical and Materials Engineering, University of Alberta, Edmonton, Alberta, Canada; 2, , Ingenuity Lab, Edmonton, Alberta, Canada; 3, National Inst of Nanotech, Univ of Alberta, Edmonton, Alberta, Canada.

Show Abstract

8:00 PM - GG5.05

Hydrophobically-Modified Silica Aerogels: Novel Food-Contact Surfaces with Bacterial Anti-Adhesion Properties

Jun Kyun Oh1, Luis Cisneros-Zevallos1, Mustafa Akbulut1.

1, , Texas A&M University, College Station, Texas, United States.

Show Abstract

8:00 PM - GG5.06

Stratified, Responsive Brush-Gel Films: Towards Biomimetic Graded Interfaces

Shivaprakash N. Ramakrishna1, Marco Cirelli2, Edmondo Maria Benetti1 2.

1, , Swiss Federal Institute of Technology ETH Zürich, Zürich, Switzerland; 2, , University of Twente, Enschede, Netherlands.

Show Abstract

8:00 PM - GG5.07

Bio-Inspired Omniphobic Surfaces of Silicon Nanopillars Modified by Triethoxysilan-Based Hybrid Coatings

Ching-Yu Yang2, Yu-Hsiang Lo2, Bi-Shen Lee2, Ta-Jen Yen2, Hsin-Ming Cheng1, Po-Yu Chen2.

1, , Material & Chemical Res Lab, Hsin Chu, Taiwan; 2, , National Tsing-Hua University, Hsin-chu, Taiwan.

Show Abstract

8:00 PM - GG5.08

Conformational Gating of DNA Conductance: From Single Molecule Charge Transport to Electrochemical Platforms for Sensor Applications

Juan Manuel Artes Vivancos1, Yuanhui Li2, Jianqing Qi3, Erkin Seker1, M P Anantram3, Joshua Hihath1.

1, , ECE UCDavis, Davis, California, United States; 2, , Univ of California-Davis, Davis, California, United States; 3, , Univ of Washington, Seattle, Washington, United States.

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8:00 PM - GG5.09

Interfaces of Molecular Recognition Sites and Biosensors: Novel Bio-Sensing Materials

Kyung Choi1.

1, , University of California-Irvine, Irvine, California, United States.

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8:00 PM - GG5.10

Selective Virus Separation with Conductive Inverse Opal Films

Chia-Hao Pai1, Chen-Hong Liao1, Eric Hwang2 4, Yung-An Huang3, Yu Cheng1, Wei-An Yeh4, Pei-Song Hong1, PuWei Wu1.

1, Materials Science and Engineering, National Chiao Tung University, Hsinchu, Taiwan; 2, Biological Science and Technology, Molecular Medicine and Bioengineering, National Chiao Tung University, Hsinchu, Taiwan; 3, Biological Science and Technology,, National Chiao Tung University, Hsinchu, Taiwan; 4, Molecular Medicine and Bioengineering, National Chiao Tung University, Hsinchu, Taiwan.

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8:00 PM -

GG5.11 WITHDRAWN (3-10-15)

Show Abstract

8:00 PM - GG5.12

Nanostructured Electrochemical Transducers Realized with Nanoimprint Lithography

Lotta Emilia Delle1, Bert Laegel2, Rainer Lilischkis1, Xuan Thang Vu3, Maryam Weil1, Patrick Wagner4, Sven Ingebrandt1.

1, Computer Sciences and Microsystems Technology, University of Applied Sciences Kaiserslautern, Zweibrücken, Germany; 2, Nano Structuring Center, TU Kaiserslautern, Kaiserslauten, Germany; 3, Institute for Physics, RWTH Aachen, Aachen, Germany; 4, Institute for Materials Research, Hasselt University, Hasselt, Belgium.

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8:00 PM - GG5.13

Inelastic Neutron Scattering Studies of Natural Silkworm Proteins

Christopher Alan Crain1, Nicholas A Strange1, Luke Daeman2, Svemir Rudic3, John Z. Larese1.

1, , University of Tennessee, Knoxville, Tennessee, United States; 2, , Lujan Center, Los Alamos Neutron Science Center, LANL, Los Alamos, New Mexico, United States; 3, , ISIS, Rutherford Appleton Laboratory, Didcot, Oxfordshire, United Kingdom.

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8:00 PM -

GG5.14 WITHDRAWN 3-20-15

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8:00 PM - GG5.15

One-Stop Solution for Delivery of Unstable Oral Drugs

Hyo-Jick Choi1 2, Ankit Kumar1 2, Carlo Montemagno1 2 3.

1, Department of Chemical and Materials Engineering, University of Alberta, Edmonton, Alberta, Canada; 2, , Ingenuity Lab, Edmonton, Alberta, Canada; 3, , National Institute for Nanotechnology, Edmonton, Alberta, Canada.

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8:00 PM - GG5.16

Development of Oral Influenza Vaccines: One Step Closer

Ankit Kumar1 2, Hyo-Jick Choi1 2, Carlo Montemagno1 2 3.

1, Department of Chemical and Materials Engineering, University of Alberta, Edmonton, Alberta, Canada; 2, , Ingenuity Lab, Edmonton, Alberta, Canada; 3, , National Institute for Nanotechnology, Edmonton, Alberta, Canada.

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8:00 PM - GG5.17

Single-Molecule Conductance Measurements of DNA:RNA Hybrids

Yuanhui Li1, Juan Manuel Artes Vivancos1, Jianqing Qi2, M P Anantram2, Ian A. Morelan3, Paul Feldstein3, Josh Hihath1.

1, Electrical and Computer Engineering, University of California, Davis, Davis, California, United States; 2, Electrical Engineering, University of Washington, Seattle, Washington, United States; 3, Plant Pathology, University of California, Davis, Davis, California, United States.

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8:00 PM - GG5.18

Study of Magnetic Hyperthermia Properties for Octahedral Fe_3O_4 Nanoparticles

Yunbo Lv1 2, Yong Yang1, Wen Xiao1, Jun Ding1.

1, Department of Materials Science and Engineering, National University of Singapore, Singapore, Singapore; 2, NUS Graduate School for Integrative Sciences & Engineering, National University of Singaproe, Singapore, Singapore.

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8:00 PM - GG5.19

Nanomaterial in Regulating the Differentiation of Stem Cells for Tissue Engineering

Shu Wang1, Xiaoning Mou2, Hong Liu1.

1, , Beijing Institute of Nanoenergy and Nanosystems, Beijing, China; 2, , Chinese Academy of Sciences, Beijing, China.

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8:00 PM - GG5.20

DNA-Guided Semiconducting Organic Particles with Hybridization-Induced Nano-Embossing

Seung Hyuk Back1, Jin Hyuk Park2, Jinkyu Roh2, Songwen Tan2, Dong June Ahn3, Chunzhi Cui3.

1, KU-KIST Graduate School of Converging Science and Technology, Korea University, Seoul, Korea (the Republic of); 2, , Korea University, Seoul, Korea (the Republic of); 3, Dept of Chemical & Biological Engr, Korea Univ, Seoul, Korea (the Republic of).

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8:00 PM - GG5.21

Bioelectric Stress Field Induced Cell Deformation in an Electric Field Stimulated Medium

Ravikumar Krishnamurthy1, V Kumaran1, Bikramjit Basu1.

1, , Indian Institute of Science, Bangalore, Bangalore, KA, India.

Show Abstract

8:00 PM - GG5.22

Dynamics of Biomolecular Interactions on Nanoparticles in Flow Fields

Hanzhe Liu2, Jeahoon Lim1, Kookheon Char1, Dong June Ahn2.

1, , Seoul National Univ, Seoul, Korea (the Republic of); 2, , Korea Univ, Seoul, Korea (the Republic of).

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8:00 PM - GG5.23

Characterization of Dipeptide-based Sorbent Materials Using Combined Thermodynamic and Inelastic Neutron Scattering Techniques

Daniele Paradiso1, Enrico Perelli Cippo2, Giuseppe Gorini3, Giorgio Rossi4, John Z. Larese1.

1, Department of Chemistry, University of Tennessee, Knoxville, Tennessee, United States; 2, , CNR - IFP, Milano, Italy; 3, Department of Physics, Milano-Bicocca University, Milano, Italy; 4, Department of Physics, Università degli Studi di Milano, Milano, Italy.

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8:00 PM - GG5.24

Control of Neurosphere Size by Using Spheroform Three-Dimensional Cell Culture System

Seung-Hyun Kim1, Jae-Hyung Jang1, Haeshin Lee2.

1, , Yonsei University., Seoul, Korea (the Republic of); 2, , KAIST, Daejeon, Korea (the Republic of).

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8:00 PM - GG5.25

Synthesis and Application of Pt Nanoparticles Supported on Functionalized Mesoporous Silica in Biosensing Devices as a Peroxidase Mimetic System

Camila Marchetti Maroneze1, Vitoria Moraes1, Glauco Pilon dos Santos1, Lauro Tatsuo Kubota1.

1, , Institute of Chemistry, State University of Campinas, Campinas, Brazil.

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8:00 PM - GG5.26

Solid State Nanopore Characterization and Conductance Effect on DNA Translocation

Salva Salmani Rezaie1 2, Manisha Gupta4 2, Hiofan Hoi1 2, Carlo Montemagno1 2 3.

1, Chemical and Materials Engineering, University of Alberta, Edmonton, Alberta, Canada; 2, , Ingenuity lab, Edmonton, Alberta, Canada; 3, , National Institute for Nanotechnology, Edmonton, Alberta, Canada; 4, Electrical and Computer Engineering, University of Alberta, Edmonton, Alberta, Canada.

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8:00 PM - GG5.27

Selective, Long-Term Transfection of Dividing and Non-Dividing Cells using Plasmid DNA-Loaded Mesoporous Silica Nanoparticle-Supported Lipid Bilayers

Eric C Carnes1, Katharine Epler1, David Patrick Padilla2, Christopher Lino1, Brandon Slaughter1, Marissa R. Anderson1, Patrick Fleig1, C. Jeffrey Brinker1 2, Carlee Ashley1.

1, , Sandia National Laboratories, Albuquerque, New Mexico, United States; 2, , University of New Mexico, Albuquerque, New Mexico, United States.

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8:00 PM - GG5.28

Facile Approach for Detection of Fungicide Residues from Grape Extract

Jon Engel Craven1, Emily Chin1, Shalini Prasad2.

1, , The University of Texas at Dallas, Richardson, Texas, United States; 2, Bioengineering, The University of Texas at Dallas, Richardson, Texas, United States.

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8:00 PM - GG5.29

MoS_2 Biomining Using Inorganic Binding Peptides

Sibel Cetinel1 2, Prasanna Bhomkar3, Feng Wang3, Weizheng Shen1 2, Carlo Montemagno1 2.

1, , Ingenuity Lab, Edmonton, Alberta, Canada; 2, Department of Chemical and Materials Engineering, University of Alberta, Edmonton, Alberta, Canada; 3, National Institute of Nanotechnology (NINT), University of Alberta, Edmonton, Alberta, Canada.

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8:00 PM - GG5.30

Antibacterial Activity of Natural Extracts Incorporated Nanoclays

Hyoung-Jun Kim1, In-Kee Hong2, Eun-Ji Kim2, Jeong-Eun Park2, Jae-Min Oh1.

1, Department of Chemistry and Medical Chemistry, College of Science and Technology, Yonsei University, Wonju, Gangwondo, Korea (the Republic of); 2, G-Tech Village, Radiant, INC., Geodu-ri, Dongnae-myeon, Chuncheon, Gangwondo, Korea (the Republic of).

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8:00 PM - GG5.31

Antimicrobial Peptides as Nature Defense Fighters at Implant Materials Interfaces

Kyle Boone1, Deniz Yucesoy2, Sarah VanOosten1, Dmytro Khvostenko1, Esra Yuca1, Candan Tamerler1.

1, Bioengineering, University of Kansas, Lawrence, Kansas, United States; 2, , University of Washington, Seattle, Washington, United States.

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8:00 PM - GG5.32

Interaction Between Food Grade TiO_2 and SiO_2 Nanomaterials and Biological Species in Suspension State

Jae-Ho Song1, Kyoung-Min Kim1, Jae-Min Oh1.

1, Department of Chemistry and Medical Chemistry, Yonsei Univerisity, Wonju, Gangwondo, Korea (the Republic of).

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8:00 PM - GG5.33

Label-Free Rapid Detection of Pathogens with Antimicrobial Peptide Assisted Impedance Spectrometry

Keren Jiang1, Hashem Etayash2, Sarfuddin Azmi2, Garima Thakur1, Selvaraj Naicker1, Kamaljit Kaur2, Thomas G. Thundat1.

1, Department of Chemical and Materials Engineering, University of Alberta, Edmonton, Alberta, Canada; 2, Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta, Edmonton, Alberta, Canada.

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8:00 PM - GG5.34

Antimicrobial Cotton: Covalent Bonding of Silver Nanoparticles to Electrospun Cotton Fibers

Yingying Zheng2, Chao Cai1, Fuming Zhang1, Jonathan Monty1, Robert Linhardt1, Trevor J Simmons1.

1, , Rensselaer Polytechnic Institute, Troy, New York, United States; 2, Physics and Key Laboratory of ATMMT Ministry of Education, Zhejiang Sci-Tech University, Hangzhou, China.

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8:00 PM -

GG5.35 WITHDRAWN

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8:00 PM - GG5.36

Eliciting Specific Cell/Surface Interactions: Non-Fouling Surfaces Decorated with Integrin Ligands

Ognen Pop-Georgievski1, Ilya Kotelnikov1, Katarina Novotna2, Vladimir Proks1, Jana Musilkova2, Lucie Bacakova2, Frantisek Rypacek1.

1, Biomaterials and Bioanalogous Polymer Systems, Institute of Macromolecular Chemistry - Prague, ASCR, Prague 6, Czech Republic, Czech Republic; 2, Biomaterials and Tissue Engineering, Institute of Physiology, ASCR, Prague 4, Czech Republic, Czech Republic.

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8:00 PM - GG5.37

Nano-Boron as an Antibacterial Agent for Functionalized Textiles

Ayse Karagoz1, Wazir Akbar1, Mohamed Noor3, Katarzyna Kowal3, Tofail Syed3, Bahar G. Basim2, Merve Unluagac4, Gokmen Ukelge4, Jacob Lum5.

1, , Ozyegin University, Istanbul, Turkey; 2, Nisantepe Mevki Orman Sk, Ozyegin Univ, Istanbul, Turkey; 3, Chemical and Environmental Sciences Department/Materials & Surface Science, University of Limerick, Limerick, Ireland; 4, , Kivanc Textile, Adana, Turkey; 5, Department of Chemical Engineering, Oregon State University, Corvallis, Oregon, United States.

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8:00 PM - GG5.38

Rapid Fabrication Technique for Development of Innovative Polyelectrolyte Biomaterial Systems

Shalini Saxena2, Ashley Carson Brown4, Miguel Fernandez3, Alberto Fernandez-Nieves3, L. Andrew Lyon1 4.

1, Schmid College of Science and Technology, Chapman University, Orange, California, United States; 2, School of Materials Science and Engineering, Georgia Institute of Technology, Atlanta, Georgia, United States; 3, School of Physics, Georgia Institute of Technology, Atlanta, Georgia, United States; 4, School of Chemistry and Biochemistry, Georgia Institute of Technology, Atlanta, Georgia, United States.

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8:00 PM - GG5.39

Nanoporous Gold Films for Electrochemical Nucleic Acid Biosensing

Pallavi Daggumati1, Zimple Matharu1, Erkin Seker1.

1, Electrical Engineering, UC Davis, Davis, California, United States.

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8:00 PM - GG5.40

Superhydrophilic and Underwater Superoleophobic PEG Cryogel Membrane for Effective Oil/Water Separation

Yanhua Zhao1, Zuankai Wang1.

1, , City University of Hong Kong, HongKong, Hong Kong.

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8:00 PM - GG5.41

Hybrid Nanopore with Improved Stability

Hiofan Hoi1, Manisha Gupta4, Salva Salmani Rezaie1, Sinoj Abraham2, Yuan He2, Andrew Jo1, Valentyna Semenchenko5, Jeffrey Germain1 5, Carlo Montemagno3 5 1.

1, Department of Chemical and Materials Engineering, University of Alberta, Edmonton, Alberta, Canada; 2, , University of Alberta, Edmonton, Alberta, Canada; 3, National Inst of Nanotech, Univ of Alberta, Edmonton, Alberta, Canada; 4, Department of Electrical and Computer Engineering, University of Alberta, Edmonton, Alberta, Canada; 5, , Ingenuity Lab, Edmonton, Alberta, Canada.

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2015-04-09

Symposium GG

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Symposium Organizers

- Yuhei Hayamizu, Tokyo Institute of Technology
- Hendrik Heinz, University of Akron
- Carole Perry, Nottingham Trent University
- Candan Tamerler, University of Kansas

GG6: Adhesion and Self Assembly

- Chair: Carole Perry
- Chair: Hendrik Heinz
- Thursday AM, April 9, 2015
- Park Central Hotel, 2nd Floor, Metropolitan III

8:00 AM - *GG6.01

Slippery Interfaces: A New Concept in Anti-Biofouling Material

Joanna Aizenberg3, Caitlin Howell1, Stefan Kolle3, Philseok Kim2.

1, SEAS, Harvard Univ, Cambridge, Massachusetts, United States; 2, Wyss Inst, Harvard Univ, Cambridge, Massachusetts, United States; 3, , Harvard University, Cambridge, Massachusetts, United States.

Show Abstract

8:30 AM - GG6.02

Spectroelectrochemistry of Oxygen-Tolerant [NiFe]-Hydrogenase on Conductive Surfaces

Nina Heidary1, Tillmann Utesch1, Stefan Frielingsdorf1, Oliver Lenz1, Peter Hildebrandt1, Maria Andrea Mroginski1, Ingo Zebger1, Anna Fischer2 1.

1, , Technische Universitaet, Berlin, Germany; 2, , Albert Ludwigs Universitaet, Freiburg, Germany.

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8:45 AM - GG6.03

Design Rules for Organized Molecular Architectures of Short Peptides on Atomically Flat Solids

David Alan Starkebaum1, Tamon Page1, Yuhei Hayamizu2, Mehmet Sarikaya1.

1, , University of Washington, Seattle, Washington, United States; 2, Organic and Polymeric Materials, Tokyo Institute of Technology, Tokyo, Japan.

Show Abstract

9:00 AM - *GG6.04

The Consequences of Water between Two Hydrophobic Surfaces on Adhesion and Wetting

Adrian Defante1, Tarak Burai1, Matt Becker1, Ali Dhinojwala1.

1, Department of Polymer Science, The University of Akron, Akron, Ohio, United States.

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9:30 AM - GG6.05

Learning New Adhesion Lessons from Pollen Bioparticles

Carson Meredith1, Haisheng Lin1.

1, , Georgia Tech, Atlanta, Georgia, United States.

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9:45 AM -

BREAK

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10:15 AM - GG6.06

Molecular Simulation of Adhesion Property Recovery in the Cellulose/Phenolic Adhesive Interface: The Role of Water Molecules

Lik-ho Tam1, Denvid Lau1.

1, , City University of Hong Kong, Hong Kong, Hong Kong.

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10:30 AM - GG6.07

New Bio-Adhesive Chemistries

Vishal Mogal1, Terry Steele1.

1, , Nanyang Technological University, Singapore, Singapore.

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10:45 AM - *GG6.08

Oligonucleotide Nanotechnology for Materials, Devices, and Therapeutics

William Andrew Goddard1, Si-Ping Han1.

1, , California Institute of Technology, Pasadena, California, United States.

Show Abstract

11:15 AM - GG6.09

Studying the Interaction Between Graphene and Peptides

Steve S Kim1, Yen Ngo1, Zhifeng Kuang1, Barry Farmer1, Rajesh Naik1.

1, , AFRL, Wpafb, Ohio, United States.

Show Abstract

11:30 AM - GG6.10

Slippery Surfaces for Marine Fouling Applications

Stefan Kolle1 2, Onyemaechi Ahanotu2, Philseok Kim2, Elisa Maldonado3, James Weaver2, Alexander Tesler1, Shane Stafslien4, Joanna Aizenberg1.

1, SEAS, Harvard University, Cambridge, Massachusetts, United States; 2, Wyss Institute, Harvard, Cambridge, Massachusetts, United States; 3, , UC San Diego, San Diego, California, United States; 4, Center for Nanoscale Science and Engineering, NDSU, Fargo, North Dakota, United States.

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11:45 AM - GG6.11

MP-SPR - A New Optical Characterization Method For Molecular Interaction and Ultrathin Films

Niko Markus Granqvist1, Annika Jokinen1, Janusz Sadowski1, Johana Kuncova-Kallio1.

1, , BioNavis, Ylojarvi, Finland.

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GG7: Applications and Devices in Materials and Medicine

- Chair: Yuhei Hayamizu
- Chair: Candan Tamerler
- Thursday PM, April 9, 2015
- Park Central Hotel, 2nd Floor, Metropolitan III

1:30 PM - GG7.01

Protein Coated Isotropic and Anisotropic Metal Nanoparticles: A Defined Bio-Interface on Nanomaterials

Moritz Tebbe1, Olga Isakin1, Roland Hoeller1, Christian Kuttner1, Andreas Fery1, Munish Chanana1.

1, , University of Bayreuth, Bayreuth, Germany.

Show Abstract

1:45 PM - GG7.02

Optimising the Solubility of Bioactive Phosphate Glass for Drug Delivery

Jamieson Christie1, Marta Corno2, Massimo delle Piane2, Piero Ugliengo2, Nora de Leeuw1.

1, , University College London, London, United Kingdom; 2, Chemistry, Universita di Torino, Torino, Italy.

Show Abstract

2:00 PM - GG7.03

Engineered Microstructure Hydroxyapatite Granules for Tailored Drug Release Rate

Min-Ho Hong1, Seong Yi1, Heonjin Choi1.

1, , Yonsei University, Seoul, Korea (the Republic of).

Show Abstract

2:15 PM - *GG7.04

Protein-Based Nano-Structure Fabrication: The Bio Nano Process

Ichiro Yamashita1.

1, , Nara Institute of Science and Technology, Ikoma, Japan.

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2:45 PM -

BREAK

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3:15 PM - GG7.05

Electrowetting on Bio-Inspired Soft Liquid-Infused Film (EWOLF): Complete Reversibility and Controlled Droplet Oscillation Suppression for Fast Optical Imaging

Chonglei Hao1, Zuankai Wang1.

1, , City University of Hong Kong, Hong Kong, Hong Kong.

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3:30 PM - GG7.06

Biologically-Templated Nanomolecular Probes for High-Resolution In Vivo Sensing and Detection

Neelkanth M Bardhan1, Xiangnan Dang1, Angela M. Belcher1.

1, Materials Science and Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, United States.

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3:45 PM - *GG7.07

The Nexus of Energy, Water, Health and Food: Thinking Small to Solve Global Quality of Life Challenges

Carlo Montemagno1.

1, National Institute of Nanotechnology, University of Alberta, Edmonton, Alberta, Canada.

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4:15 PM - GG7.08

In-Situ Manipulation of Droplet Motions on Bio-Inspired Superhydrophobic Surfaces for Advanced Lab-on-a-Chip Platform

Jungmok Seo1, Seung-Ki Lee1, Jaehong Lee1, Jung Seung Lee2, Seung-Woo Cho2, Jong-Hyun Ahn1, Taeyoon Lee1.

1, School of Electrical and Electronic Engineering, Yonsei University, Seoul, Korea (the Republic of); 2, Department of Biotechnology, Yonsei University, Seoul, Korea (the Republic of).

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4:30 PM - GG7.09

Investigation of High-Aspect Ratio Nanoelectrodes for Improved Cell-Chip Coupling and In-Cell Recordings

Jan Schnitker1, Francesca Santoro1 2, Andreea Belu1, Gregor Panaitov1, Elmar Neumann1, Bernhard Wolfrum1, Andreas Offenhaeusser1.

1, , FZ Jülich, Jülich, Germany; 2, , Stanford University, Stanford, California, United States.

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4:45 PM - GG7.10

Carbon Nanotube Porins: Synthesis, Characterization and Ensemble Transport Properties

Kyunghoon Kim1 2 3, Jia Geng1 3 4, Ramya Tunuguntla1 3, Luis R. Comolli5, Costas P Grigoropoulos2, Caroline Ajo-Franklin3, Aleksandr Noy1 3 4.

1, Biology and Biotechnology Division, Lawrence Livermore National Laboratory, Livermore, California, United States; 2, Mechanical Engineering Department, University of California at Berkeley, Berkeley, California, United States; 3, The Molecular Foundry, Lawrence Berkeley National Laboratory, Berkeley, California, United States; 4, School of Natural Sciences, University of California at Merced, Merced, California, United States; 5, Life Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, California, United States.

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2015-04-10

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Symposium Organizers

- Yuhei Hayamizu, Tokyo Institute of Technology
- Hendrik Heinz, University of Akron
- Carole Perry, Nottingham Trent University
- Candan Tamerler, University of Kansas

GG8: Tunable Interfaces

- Chair: Yuhei Hayamizu
- Chair: Hendrik Heinz
- Friday AM, April 10, 2015
- Moscone West, Level 3, Room 3006

8:15 AM - GG8.00

Intrinsic and Induced Chirality of CdSe Nanocrystals

Maria Mukhina1, Vladimir Maslov1, Alexander Baranov1, Anatoly Fedorov1, Finn Purcell Milton2, Yurii Gun'ko1 2.

1, , ITMO University, Saint Petersburg, Russian Federation; 2, , University of Dublin, Trinity College, Dublin, Ireland.

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8:30 AM - GG8.01

Bioinspired Compatibilization of Internal Material Interfaces in Composite Materials

Valeria Samsoninkova1 2, Felix Hansske2, Wolfgang Wagermaier2, Hans Boerner1.

1, , Humboldt Universität zu Berlin, Berlin, Germany; 2, , Max-Planck Institute of Colloids and Interfaces, Potsdam, Germany.

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8:45 AM - *GG8.02

Penetration of a Massive Volume of Water between 2D Oxide LayersPenetration of a Massive Volume of Water between 2D Oxide Layers

Takayoshi Sasaki1.

1, , National Institute for Materials Science, Tsukuba, Ibaraki, Japan.

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9:15 AM - GG8.03

Understanding Binding Affinity of Peptides to Graphene Surfaces as a Function of Concentration using Atomistic Simulation and Experiment

Amanda Garley2, Vikas Varshney1, Corrinne Welch1, Rajiv J. Berry1, Rajesh Naik1, Hendrik Heinz2.

1, , Air Force Research Laboratory, Dayton, Ohio, United States; 2, , University of Akron, Akron, Ohio, United States.

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9:30 AM - GG8.04

Single Molecular Layer Adaption of Interfacial Surfaces by Cyclic Azasilane "Click-Chemistry"

Annalese F Maddox1, Janis G Matisons1, Mani Singh1, Barry Arkles1, Youlin Pan1.

1, , Gelest Inc., Morrisville, Pennsylvania, United States.

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9:45 AM -

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10:15 AM - GG8.05

Brush-Hydrogels with Graded and Gradient-Like Properties: From Organic to Hybrid Biomimetic Coatings

Ella Shafagh Dehghani1, Nicholas Spencer2, Edmondo Benetti2 3.

1, , ETHZ, Laboratory for Surface Science and Technology, Zürich, Switzerland; 2, , ETH Zurich, Zürich, Switzerland; 3, , University of Twente, Enschede, Netherlands.

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10:30 AM - *GG8.06

The Unified Contact Angle Model (UCAM) for Fabricating Designer Surfaces for Quantitative Control of Contact Angles and Wetting Behavior

Jacob N. Israelachvili1, Yair Kaufman1, Himanshu Mishra1, Szu-Ying Chen1, Saurabh Das1, Adair Gallo2, Alex Schrader1, Dong Woog Lee1.

1, , University of California Santa Barbara, Santa Barbara, California, United States; 2, Ministry of Education of Brazil, CAPES Foundation, Brasilia, Brazil.

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11:00 AM - GG8.07

Characterizing the Organization and Investigating the Conformation of Peptide Self-Assembled Monolayers on Gold Nanoparticles: An Experimental and Computational Approach

Elena Colangelo1.

1, , Institute od Materials Research and Engineering, Singapore, Singapore.

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11:15 AM - GG8.08

Design of Biomimetic Surfaces to Interrogate the Role of Glycosaminoglycans in Chemokine-Induced Myoblast Behaviour

Dhruv Thakar1 2, Elisa Migliorini1 2, Fabien Dalonneau3, Rabia Sadir4, Olivier Renaudet1 2, Hugues Lortat-Jacob4, Didier Boturyn1 2, Liliane Coche-Guerente1 2, Catherine Picart3, Ralf Richter1 2 5.

1, , Univ. Grenoble Alpes, DCM, Grenoble, France; 2, , CNRS, DCM, Grenoble, France; 3, , UMR 5628 (LMGP), CNRS and Grenoble Institute of Technology, Minatec, Grenoble, France; 4, , Institut de Biologie Structurale UMR CEA-CNRS-UJF 5075, Univ. Grenoble Alpes, SAGAG Group, Grenoble, France; 5, , CIC biomaGUNE, San Sebastian, Spain.

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11:30 AM - GG8.09

Adsorption Behaviors of Key Serum Proteins on Nanostructured Biomaterials: A Perspective from Visualizing Their Conformations

Hua Li1, Yi Liu1, Jing Huang1.

1, , Ningbo Institute of Materials Technology & Engineering, CAS, Ningbo, China.

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11:45 AM - GG8.10

Interactions of Biomolecular Antioxidants with Lipid and Protein Tissue Components

Jacob R. Bow1, Krysta Biniek1, Reinhold H. Dauskardt1.

1, , Stanford University, Stanford, California, United States.

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GG9: Medical Applications

- Chair: Candan Tamerler
- Chair: Yuhei Hayamizu
- Friday PM, April 10, 2015
- Moscone West, Level 3, Room 3006

1:30 PM - GG9.01

Advanced 1D Nanomaterial-Assisted Electroporation for Novel Bacteria and Viruses Disinfection

Chong Liu1, Xing Xie2, Wenting Zhao1, Yi Cui1 3.

1, MSE, Stanford University, Stanford, California, United States; 2, CEE, Stanford University, Stanford, California, United States; 3, SLAC, Stanford University, Stanford, California, United States.

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1:45 PM - *GG9.02

The Distinct Adsorption Profiles of Exosomes on Various Inorganic Materials

Sachiko Matsumura1, Tamiko Minamisawa1, Kanako Suga1, Kiyotaka Shiba1.

1, , Cancer Institute, JFCR, Tokyo, Japan.

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2:15 PM - GG9.03

Direct Intracellular Delivery of Synthetic Biomolecules Using Nanostraws

Alexander Xu1, Amin Aalipour1, Nicolas A Melosh1.

1, Department of Materials Science, Stanford University, Stanford, California, United States.

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2:30 PM - GG9.04

Development of an Adenovirus Liposomal Encapsulation Method to Improve Viral Gene Therapy

Natalie Mendez1, Vanessa Herrera1, Lingzhi Zhang1, Farah Hedjran1, William Trogler2, Sarah Blair1, Tony Reid1, Andrew C. Kummel2.

1, , University of California, San Diego, La Jolla, California, United States; 2, Dept Of Chemistry, Univ of California-San Diego, La Jolla, California, United States.

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2:45 PM -

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3:15 PM - GG9.05

3D Protein Gradients on Scaffolds for Tissue Engineering: A Polymer Brush-Assisted Fabrication

Edmondo Maria Benetti1 2, Michel Klein Gunnewiek2, Andrea Di Luca3, Clemens van Blitterswijk3, G. Julius Vancso2, Lorenzo Moroni3.

1, , Swiss Federal Institute of Technology ETH Zürich, Zürich, Switzerland; 2, Materials Science and Technology of Polymers, University of Twente, Enschede, Netherlands; 3, Department of Tissue Regeneration, University of Twente, Enschede, Netherlands.

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3:30 PM - *GG9.06

Scaffolds for Bone Tissue Engineering

Antoni P. Tomsia1.

1, Div Matls Science, Lawrence Berkeley National Lab, Berkeley, California, United States.

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4:00 PM - GG9.07

High-Throughput Fabrication of Micropatterned Polymeric Nanowire Arrays for High-Resolution Drug Loading and Topographical Cellular Control

Cade B. Fox1, Jean Kim2, Erica B. Schlesinger2, Hariharasudhan D. Chirra1, Tejal A. Desai1 2.

1, Bioengineering and Therapeutic Sciences, University of California, San Francisco, San Francisco, California, United States; 2, Bioengineering, UC Berkeley & UCSF, San Francisco, California, United States.

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4:15 PM - GG9.08

Tuning the Fate of Stem Cells by Using Physical Signals from Biomaterials

Hong Liu1 2, Xiaoning Mou1, Jianhua Li2 1.

1, , Beijing Institute of Nanoenergy and Nanosystems，CAS, Beijing, China; 2, , State Key Laboratory of Crystal Materials, Shandong University, Jinan, China.

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4:30 PM - GG9.09

Breast Cancer Detection using Charge Sensors Coupled to DNA Monolayer

Marina Ribeiro Batistuti1, Paulo Roberto Bueno2, Marcelo Mulato1.

1, , University of São Paulo, Ribeirão Preto, Brazil; 2, Physical Chemistry, Universidade Estadual Paulista "Júlio de Mesquita Filho", Araraquara, São Paulo, Brazil.

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4:45 PM - GG9.10

Engineering of Bacterial Biofilms by Substrate Topography

Arunima Bhattacharjee1, Allon Hochbaum1.

1, , University of California, Irvine, Irvine, California, United States.

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